



**Independent Scientific Review Panel**  
for the Northwest Power Planning Council  
851 SW 6<sup>th</sup> Avenue, Suite 1100  
Portland, Oregon 97204  
isrp@nwppc.org

# Umatilla M&E Review

Review of the Umatilla Fish Hatchery Monitoring and  
Evaluation Project (199000500) document,  
“Comprehensive Assessment of Salmonid Restoration and  
Enhancement Efforts in the Umatilla River Basin”

Charles C. Coutant  
John D. McIntyre  
Bruce Ward  
Richard Whitney

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## Review of the Umatilla Fish Hatchery Monitoring and Evaluation Project (199000500) document, “Comprehensive Assessment of Salmonid Restoration and Enhancement Efforts in the Umatilla River Basin”

### Background

As requested by the Council on May 15, 2003, the ISRP reviewed the Umatilla Fish Hatchery Monitoring and Evaluation Project’s (199000500) progress report titled a “Comprehensive Assessment of Salmonid Restoration and Enhancement Efforts in the Umatilla River Basin.” This submittal was provided by the Oregon Department of Fish and Wildlife to address conditions placed on the project as part of Council’s decision on Columbia Plateau province proposals for Fiscal Years 2002 through 2004. These conditions were developed in response to the issues and concerns raised by the ISRP (ISRP 2001-8 and ISRP 2001-8 Addendum 199000500; [www.nwcouncil.org/library/isrp/isrp2001-8.htm](http://www.nwcouncil.org/library/isrp/isrp2001-8.htm)) and the Council as part of the provincial review for this project.

In a January 11, 2002, memorandum from the Council to the project sponsors, the Council recommended that:

*“[a] determination is needed to ensure that the stated purpose for the artificial production initiative and specific goal and objectives can be assessed under the current study designs...This review needs to address not only the overarching goal of the assessment, but also the specific questions in the ISRP review...In addition, the long-term outcome from the evaluation as it relates to the artificial production initiative being monitored needs to be addressed.”*

This statement reflected a concern expressed by the ISRP that the current study plan focuses on internal operations of the hatchery, whereas achievement of the goal of the hatchery initiative will require focus upon restoration of salmon and steelhead populations measured in the river. The ISRP provided clarification of our comments in a March 5, 2002 memo. The ISRP recommendations from that memo (elevated to requirements by the Council), upon which this response is based, emphasized the need for “...a progress report with an evaluation of the reintroduction and supplementation efforts in the Umatilla River.”... and ..” a study plan to describe a redirection of effort out and away from the hatchery and into the field...”, that would move the focus of hatchery evaluation from an internal focus on hatchery operations, to a focus on external effects on fish populations returning to the river.

The sponsor’s current submittal is the requested progress report, which is herein reviewed by the ISRP. It has three stated objectives (page 1, paragraph 1):

1. Fulfill the ISRP request to document the Umatilla fisheries restoration program’s progress in meeting the Umatilla Hatchery Master Plan goals,
2. Provide the fisheries co-managers with a synthesis of current anadromous fisheries restoration results, and
3. Provide assessment of the Umatilla anadromous fisheries program and identify data gaps and critical uncertainties for development of monitoring and evaluation strategies for the Umatilla Subbasin Plan.

## Conclusion and Recommendations

### *The draft “Comprehensive Assessment of Salmonid Restoration and Enhancement Efforts in the Umatilla River Basin”*

The draft progress report is an impressive document and the sort of forthright technical analysis the ISRP envisioned. It is a major step in the right direction for evaluation of the Umatilla hatchery initiative. It points to a shift in emphasis from hatchery operations to the impacts on fish populations in the field. The project sponsors have assembled a large amount of data and have expressed intentions to do more. The program assessments for spring chinook, steelhead, and fall chinook are especially valuable for informing the ISRP and Council. Preliminary judgments about the value of the programs, unintended consequences, unrealistic earlier estimates and goals, and unmet expectations as well as successes are documented -- a step that is very important for planning future actions. These report findings will be useful in reexamining the objectives, operations, and management of the artificial production program and valuable in informing the upcoming Umatilla subbasin planning process. The report shows the value of redirecting the monitoring and evaluation efforts away from the hatchery operations to the current questions about stock success. The final report should fulfill the Council's request for a progress report on restoration efforts for salmon and steelhead in the Umatilla River. Specific ISRP comments are provided below to aid the sponsors in finalizing the report. In general, they should continue the assessments they have started in this report using additional existing data and new data collected in response to a revised study design. That revised study design should focus on addressing uncertainties evident from the data contained within the progress report, particularly in areas of assessment of adult catch and estimation of smolt yield.

### *Revised Study Plan*

The Council decision and ISRP comments called for submittal of a revised study plan, but one was not provided. We appreciate the effort that went into production of the progress report. It has to be noted, however, that the response to Council is incomplete and will remain so until a revised study plan is submitted. The sponsors initially proposed to present a revised study plan in December, 2002, but felt it wise to complete the progress report before proceeding with the study plan (letter of June 26, 2002 from Richard W. Carmichael). We agree that this approach has merit, except that we are concerned that the existing study plan for Hatchery Effectiveness Evaluation will continue to provide the basis for collection of information not related to the larger, significant issues that have been revealed by the progress report. Much of the information provided in the progress report was produced as a separate and distinct effort, rather than springing as a natural product from what the study plan itself should have produced.

According to the Carmichael letter, some of the issues raised by the ISRP are now proposed to be dealt with during subbasin planning. We agree that some of these issues, such as overall goals for numbers of fish to be achieved in the Umatilla River might be appropriately addressed at a later date. In the meantime, a protocol needs to be developed that spells out the kinds of information needed to evaluate the effectiveness of the hatchery initiative in terms of measures undertaken to meet the primary objectives of the program, which are currently focused upon contributions of fish to harvest, reintroduction/restoration, and supplementation. To achieve the necessary evaluation of the hatchery initiative, a revised study plan is needed that goes beyond the present focus on internal operations of the hatchery and the numbers of juvenile salmon and steelhead to

be released from the hatchery. Instead, the focus of monitoring and evaluation should be upon the goals and objectives for restoration of fish and fisheries in the Umatilla River. The study plan should include description of the monitoring, evaluation, and experimental designs needed to evaluate the effectiveness of measures taken to meet the goals and objectives. The hatchery and harvest programs should be experimentally modified along the lines suggested in the progress report, and the revised study plan should be designed to measure and evaluate the results of these modifications.

As part of this effort, the project sponsors should carefully examine whether the Umatilla provides an appropriate site to test a number of generic fish management strategies of use regionally. For example, the fact that all fish may be intercepted at Three Mile Falls Dam, where the hatchery is located, seems to offer some possibilities for studies of relative effectiveness of spawning of natural vs. hatchery steelhead in the wild, a question that arises in many supplementation venues. Given the success in providing a fishery downstream of the hatchery, the fact that natural spawning does occur upstream, and the limits observed in productive capacity of upstream areas, a question might be posed as to whether the acclimation sites continue to serve a useful function. An experiment could be designed to answer that question. Some of these experiments can likely be done elsewhere in the basin to address the systemwide uncertainties associated with supplementation and enhancement of fisheries. These are larger questions than this program alone can answer, but this program might provide key information in the development of a regional plan to address them.

*Implications for Subbasin Planning and for the Hatchery Initiative in General*

This progress report should be a key document in the Umatilla subbasin planning and assessment effort. The fish managers should do some strategizing in the subbasin plan with all this technical analysis laid out for the various stakeholders to see. The proposed new directions that came to light from analyses for the progress report should be incorporated into the subbasin plan. Given the analyses, the various goals and elements of the program need to be reconsidered, as the sponsors have suggested. Specifically, the analyses throw into question the efficacy of the fall chinook restoration and steelhead supplementation elements of the program. Even the most successful element of the program, the spring chinook reintroduction/enhancement, needs to be critically examined, and perhaps refocused.

Although beyond the purview of this immediate ISRP review, there are some basic economic questions that should be considered and addressed by the Umatilla subbasin planners. Management of water and fish is uniquely linked in this subbasin. Water is pumped from the Columbia River into the Umatilla River Basin to replace water used for irrigation, a process intended to leave water in the Umatilla River to benefit fish. There is a basic question to what extent does the money spent for pumping benefit fisheries and/or agricultural pursuits. The progress report was noticeably silent on the issue of effects on fish of the elaborate and expensive water supply measures that are being undertaken in the Umatilla River Basin.

A question arises what is the total cost of this program for fish restoration and the associated irrigation storage and distribution system? What are the associated benefits to agriculture and fisheries? It would be interesting, by itself, to know what the power cost for pumping water out of the Columbia River into the Umatilla River was in the year 2001, when power costs escalated

so markedly. Given what appear from the progress report to be rather poor production and harvest of salmonids in upstream areas, perhaps upstream measures intended to benefit fish might be abandoned in favor of emphasis on harvest of the hatchery returns below Three Mile Falls Dam. On the other hand, additional upstream water management efforts may be justified if natural production of fish is to be enhanced. Relative values of agricultural activities and the fisheries supported should be considered. In this case, treaty fishing rights may be a deciding policy factor, but there would be an opportunity to identify that as the basic motivation for the program. The subbasin planners will have an opportunity to conduct some analyses along these lines and incorporate decisions related to these issues in the subbasin plan. Because of the unique measures being implementing in the Umatilla Subbasin, we expect to see some cost reporting and analysis in the subbasin plan.

## **General Summary and Comments**

Finalization of the draft progress report should take into account the following general and specific comments.

Information, in summary form, on the full scope of fish and habitat assessment and restoration activities in the Umatilla River is needed in the “Introduction” to the progress report; this information would put the monitoring and evaluation efforts in a proper context. Information needed includes a brief description of the hatchery and satellite facilities and their operations. In addition, description is needed of the BPA-funded water management projects that are intended to improve the water supply in the Umatilla River for salmon and steelhead. The progress report was noticeably silent on the issue of effects on fish of water supply measures that are being undertaken in the Umatilla River Basin. There should be a general description of the salmonid habitat provided in the river as a result of management measures, such as the water releases mentioned on page 171, and including the project “Power Repay”, which is responsible for pumping water from the Columbia River purportedly to alleviate some of the unfavorable conditions for fish in the river.

Additionally, the effects of water management measures on each of the three stocks should be described in the respective sections of the report. In fact, monitoring and evaluation of natural production ought to include evaluation of the effectiveness of these measures in providing or improving fish habitat. Most of this contextual information was provided previously, during the provincial review process, but it should be updated and provided in this document as a background against which the effectiveness of the restoration activities can be evaluated.

A significant finding in the progress report is that the preliminary estimate of the productive capacity of the Umatilla system for salmonids was too high. It seems that productivity of the Umatilla system for anadromous salmonids either was never comparable to other near-by systems or alteration of water quantity and quality and channel morphology have greatly reduced its productivity for these species. Local fisheries for spring chinook salmon and steelhead have been enhanced with hatchery fish, but producing the desired (or acceptable) harvest from natural production seems an unlikely prospect given present conditions of habitat in the system and the Columbia River basin. The analysis shows that it is not safe to assume that because a run is smaller than expected or desired that the habitat is “underseeded” making it a viable candidate

for supplementation. This progress report demonstrates that capacity for naturally reproducing populations can best be judged by analysis of data on smolts per spawner plotted against number of spawners, such as shown for spring chinook in figure 26 and for steelhead in Figure 60. Data such as in table 40 are also useful. The conclusion is that initial goals for natural production of salmon and steelhead in the Umatilla River need to be adjusted downward. This could serve as a good example of adaptive management.

There are a number of statistical questions that deserve closer scrutiny.

- Confounding of factors in execution of studies is apparent in a number of instances.
- There are genetic questions related to the steelhead supplementation program, having to do with selection of brood stock and the like, that might deserve further attention.
- Confidence in data collected from catch (tribal and commercial) and smolt yield estimates, is essential, since these are key components to the smolts-per-spawner and spawner abundance relationship which should drive the decision analysis. Careful statistical design is required. The intercept on the x-axis of  $\ln$  (smolts-per-spawner) versus spawners (e.g., fig. 26) is an estimate of the escapement at capacity, and the intercept on the y-axis is the maximum productive capability – valuable reference points.

The program is generally advertised as a model for fish restoration. However, the program seems to fall short of goals for increasing naturally reproducing populations, and the primary benefit is providing hatchery fish for harvest below the hatchery. Such a conclusion should be provided early in the report, perhaps in an Executive Summary.

## ***Spring Chinook***

### **Summary**

In spite of low smolt-to-adult survival, the Umatilla hatchery program has, in recent years, produced a return (Figure 14) of spring chinook salmon sufficient to initiate a fishery. Even with supplementation of the natural run with hatchery fish, however, adults from natural production make a small contribution to the return.

Study results corroborated earlier studies in finding that yearling spring chinook salmon produced a much greater return than younger and smaller fish at release, and that hatchery loading densities are enhanced by oxygen supplementation.

The program has produced information suggesting that original goals for adult fish production were too high. Spawners needed to fully “seed” (580) the remaining natural habitat appear to have been overestimated. Approximately 14,000 smolts are produced by as few as 250 spawners; more spawners did not produce more smolts (Figure 26). The original expectations for survival of hatchery fish offspring are not consistent with realized survival rates. Either the habitat used cannot support greater numbers of spring chinook salmon, or the fish are not using all of the system’s productivity. Incomplete use of the productivity could result if spawners are

concentrated in the area where they were acclimated and released as juveniles and not distributing themselves throughout the basin for spawning.

Trials to assess the relative success of smolts produced at different locations, and time and size-at-release trials have not produced useful data because treatments have been discontinued, or size and time-of-release are not comparable between treatments. It is curious that program personnel felt a need to repeat time-and-size at release and oxygen supplementation experiments at all. Trials to assess the value of oxygen supplementation could have been concluded much earlier.

### **Comments (Intended to be helpful to the sponsors in revising the draft)**

- Reviewers found it difficult to associate the “Methods” and “Results” sections for spring chinook with specific “uncertainties” or “objectives”. The “Discussions” are helpful, but difficult to tie back to the results. To be most helpful, the text might be reorganized around the objectives or the uncertainties. This may chop up the text and lead to some repetition, but the repetition might be dealt with by sending the reader back to the necessary paragraph or page.
- For evaluation of the spring chinook program, the most helpful data are shown in figure 14 with the numbers of juveniles released and the numbers of returning adults counted. On page 15, the conclusion is made that the hatchery programs have not met the goals of the Master Plan. It appears that the Master Plan has underestimated the return rate. The figure suggests that doubling the number of smolts (to about 1,500,000) might lead to meeting the adult goal of 12,000 returnees. In other words, the goal of 2,329,000 juveniles might be higher than necessary to meet the adult goal.
- Table 10 does not make it clear what the numbers were for the test of Michigan versus Oregon raceways, as indicated in the table heading.
- There is a question whether upstream releases of spring chinook are productive given that tribal fishing effort seems to be low up there. Is it? Are the satellite facilities there performing the function intended?
- Table 12 displays a test that is not a test. Since the “standard” fish were released in January, a month and a half later than the “fall” release, it seems only to be expected that they would be somewhat larger. What is the purpose of this test? What is the conclusion? See Page 74 where the same problem is discussed for steelhead, and it is acknowledged that a confounding time variable was introduced. This makes it impossible to come to any conclusions about the effect of size at release, regardless of what the size was.
- In Table 13, what is the explanation for the difference in detection rates experienced in 2001 and not the other years? Could it be that Umatilla River flows were exceptionally low in January that year because of the drought? Or because of effects in the Columbia River itself?
- Table 14. Can the percent survival estimates be related to river flow management?

- Table 15. The Columbia River detections should be identified as to the particular dam where the detection occurred because survival will differ according to how many dams have been passed. In fact, it is not clear how these Columbia River survival estimates were made. Is it possible to use the Jolly-Seber method?
- Table 18. Is 2301 smolts in 95BY a typo?
- Page 41. Spring Chinook – Fisheries Restoration and Enhancement. In this case, the uncertainties and objectives are few enough that the reader is able to follow the presentation, where it was not possible to do in the earlier section on Hatchery Effectiveness.
- Page 42, top, and page 43 paragraph 3. It is not clear what the basis is for the 10% harvest rate. It would seem that a much higher rate could be tolerated at times, since the hatchery escapement will have been achieved because removals occur when the fish are counted at the dam, and natural production is a secondary objective. A numerical spawning escapement goal (582) is specified on page 50 (middle), and this goal is said to have been exceeded in nine of twelve years. It seems odd that a harvest rate should be specified as a percentage of the run, when it would be feasible to set a numerical harvest goal based on counts at Three Mile Falls Dam, and it would be possible to vary the number each year. [We note on page 43, bottom, the managers will reassess the 10% goal during the subbasin planning process.]
- Page 49 at the bottom states that in one model used to estimate the number of parents that spawned, the ratio of males to females is assumed to be 1:1 in the run. Yet Figure 9 shows a higher proportion of females than males were counted at Three Mile Falls Dam. The difference here might lie in the assumption that one male is involved in only one spawning (i.e. one redd), which is probably not true. Perhaps it would be instructive to account for males and females separately, since the sex of fish is known at the time they pass Three Mile Falls Dam and again when carcasses are recovered.
- Page 50. First sentence. Can methods and observer effects be eliminated from these observations?
- How does this fit with Objective 40 “Determine sex ratios and spawning distribution by sex of hatchery and natural spawners, etc”?
- Page 50 at the bottom. Does the fact that a large percentage of naturally spawned females are spawning above the acclimation sites suggest that acclimation sites may not be needed at some future date? What would be the criteria for deciding?
- Page 51. “...time constraints created by high number of spawners prevented surveyors from collecting scales.” The surveyors should be impressed with the fact that it is absolutely necessary to take some scales, not necessarily from every fish, but from a sample. The number of fish to sample should be specified by the designer of the study and adhered to rigidly.

- Page 52. Fish Passage operations haul fish upstream. How does this affect the spawning counts? Are these fish included in the counts of fish that pass Three Mile Falls Dam? How does the timing of this operation compare with the timing of fish allowed to pass the dam? Are fish that are trucked marked so that their survival rate and success in spawning can be determined?
- Page 52. The Discussion here includes several possible reasons for the shortfall in escapement assessment. Strategies are needed to eliminate the incorrect alternatives. Lots of hatchery fish are found near the acclimation site. Are spawners found in expected numbers relative to the mainstem in all tributaries? How evenly are the spawners distributed throughout the basin? Need to consider what it takes to eliminate alternative explanations for poor adult to smolt survival.
- Page 54. Describe “The Meacham Dam Project” in the Introduction.
- Page 55. Is there a chance for an experiment here, where parent/progeny ratios before and after a weir might be constructed could be compared?
- Program Assessment. The information provided should be of benefit to the planners in developing the subbasin plan in Fall 2003.
- Page 69. “More detailed reporting of the timing, location, and amount of tribal fishing effort, harvest and catch rates is needed to provide managers information for assessing harvest potential and the effectiveness of various management strategies.” Good statement, which the ISRP supports.
- Page 70. “The purpose of forgoing harvest opportunities to provide spawning escapement in excess of the numbers needed for full seeding is unclear and inconsistent with the program’s overall goal stated in the Master Plan.” This is an important finding.
- Page 71. Top of page. The data appear to be sufficient already to conclude that the Master Plan overestimated the potential natural production, and that escapement goals are too high as a result. The suggestion that 2-3 more years of natural production data analysis are needed to address this “uncertainty” seems questionable.

## **Summer Steelhead**

### **Summary**

This project (apparently) was conceived as a supplementation project based on the assumption that "...carrying capacity of the system has not been met and the natural population of the target species is depressed to a degree that it cannot effectively respond to fill that capacity." Because the goal is "... to have a consumptive steelhead fishery ..." the strategy was to overcome this deficiency and to take advantage of habitat productivity improvements expected from watershed projects by supplementing the perceived deficit of spawners with hatchery fish. All of this requires knowledge of the capacity of the system for producing steelhead smolts. The project does include an element for describing the relation between the number of smolts produced and spawning population size (Table 30). There is no clear signal from the data presented that increasing spawner abundance has increased the number of smolts produced. The total number of returning adults seems to be greater since supplementation began (Figure 38), but there is no convincing argument that this increase would not have occurred in the absence of supplementation. This possibility gains further support from evidence reported here that residual hatchery fish are displacing wild fish.

The report includes acknowledgment that the natural capacity of the system to produce steelhead may have been met. It is likely given the low smolt-to-adult survival estimates that natural production cannot produce the desired harvest opportunities while protecting adequate numbers of fish for spawning. Enhancement of harvestable numbers of fish is likely to require creative and responsible use of hatchery fish under these conditions. Management of such a system requires reliable information regarding escapement requirements, harvest, and any deleterious effects of hatchery fish management.

If the project is to continue, methods used to gather information to describe smolt abundance and spawning population size need to be improved. Because of the importance of these data, immediate action is needed to overcome the many sources of potential error described in the reports (e.g., run-strength, harvest, hatchery vs. wild, etc.). If it is too difficult to reduce error, new strategies for gaining useful information are needed.

### **Comments (Intended to be helpful to the sponsors in finalizing the draft)**

- Page 73. Shouldn't the uncertainty be "Is our production goal realistic?" This would give direction to the objectives.
- Page 76. The first sentence of the large paragraph at the top of the page would serve a good purpose at the front end of the spring chinook Methods section as well as here. Other, similar sentences from the middle of the paragraph would be helpful too (e.g., the video monitoring sentence).
- Page 78. Top of page. It ought to be possible to combine the data for a more powerful test of differences between acclimation locations.

- Page 81. Top paragraph. Timing of release is a confounding factor in interpretation of the data, as the text has already pointed out. Residualization is certain to be higher in late release groups. The next paragraph also mentions confounding due to Bonifer Springs effects. In other words, the experiment produced no information on effects of size at release on migration survival. Both large-grade and small-grade hatchery smolts might residualize, not just small-grade, as suggested. Faster-growing males tend to begin to mature and fail to migrate. The consequences as a subsequent competitor and predator in-stream may be serious. We suggest hatchery fish be released as low as feasibly possible in the watershed, and nearer the area of highest recreational fishery effort. The residualism effect may be under-estimated here – further review and study is recommended, along with program adjustments to reduce the effect.
- It would be interesting to include a discussion of possible interactions of flow on survival. Is there a different flow effect in the upper river versus the lower? For example see page 111, first paragraph, which states there was no water below Three Mile Falls Dam in the steelhead season 1992-93.
- Page 94, Figure 38. Does this graph include stray hatchery fish? It seems that the hatchery fish are depressing the wild. If that is so, how does that influence the figure?
- Page 100. Fisheries Restoration and Enhancement. Page 101. Top of page. The sampling schedule should be more fully described. There is no information on the total number of days sampled. Were the upper and lower river strata sampled equally or in proportion to their expected catch or effort or some other scheme? In the next paragraph no explanation is given of how the estimate was obtained of the percentage of anglers actually contacted during the survey or what method was used to select those contacted.
- Page 132. Program Assessment. Since the goal of the program focuses on fishery restoration, reviewers expected the program assessment to focus on this aspect. The subject is covered well under “Fishery Restoration and Enhancement”, but it would be appropriate to refer to it again under this heading. In this section percentages of hatchery and natural fish are referred to, but, judging by the program goal to restore the fishery, the bottom line ought to be total catch and catch per effort in the fishery. Page 102 indicates the non-tribal fishery took an average of 89 hatchery steelhead per year in the years 1993-4 to 2000-1, and the catch (and release) of natural-run steelhead ranged from 37 to 733. The tribal fishery from 1992-2001 took an average of 3.8 natural steelhead and 43.6 hatchery fish. These are not large numbers.
- Page 132. Paragraph 2. Here, the original and revised goals are discussed in terms of total run size.
- Page 133. Bottom paragraph. A sentence reads, “Estimates of hooking mortality of natural steelhead are not available, but are likely low.” This assumption is probably not warranted. Earlier in the text it is mentioned that bait accounts for over 90% of the terminal gear used in the fishery. There are plenty of studies that show hooking mortality of bait-caught fish can be rather high (c.f. Barnhart, R. A. and T. D. Roelofs, 1987. Proceedings of a National

Symposium on Catch-and-Release Fishing: A Decade of Experience. Humboldt State University, Arcata, CA. 297 pp.)

## **Fall Chinook**

### **Summary**

The fall chinook salmon program seems to be a candidate for termination. In a rush to produce large returns, fish from out of the basin are being used with results including poor survival, excessive straying, and excessive jack production. Project personnel have learned that fall chinook do not use as much of the river as originally projected. They have learned that land management has significantly altered habitat, that “There is almost no participation in the fall tribal fishery,” and that natural production potential and smolt survival is far less than originally predicted. On page 171, in the discussion on natural production of fall chinook, it is said that “The natural subyearling smolts migrate from late May through July as long as water exists in the lower river. ....most of the natural migration is occurring in June, July, and August when the lower River exceeds 20°C and approaches 25°C in some years.” The water temperatures provided and the words “...as long as water remains in the river” are probably sufficient to conclude that there is little or no likelihood of success of a fall chinook restoration or enhancement program in the Umatilla River under existing conditions.

On page 179, the concluding paragraph reads, “The fall chinook program is the least successful part of the Umatilla anadromous fishery restoration program. The requirement to wire-tag all hatchery production is costly, straying fall chinook create management problems in other basins (Hayes and Carmichael 2002), and the current degraded state of the lower Umatilla River may prohibit any consistent natural production. Given the low SAS and the current, reduced program, we can expect even lower returns in the future. In light of the above issues, managers should reevaluate fall chinook management objectives and production goals.” To the list of issues might be added the fact that there is virtually no contribution of fall chinook to fisheries in the Umatilla Basin, and the contribution elsewhere is not substantial enough to justify continuation of the program.

The investigators have not made good use of results of fall chinook studies elsewhere. Many experimental trials with hatchery fall chinook salmon have been completed in Columbia Basin hatchery programs and development centers. This project, however, seems to have presumed that results from other programs do not to apply in the Umatilla River. In addition, many of the trials described in the report extend far beyond the time required to formulate a conclusion. Some of the conclusions in this report could have been made several years ago (see figures 65 and 66 for example). The report would be more valuable regionally if placed in the context of other attempts to increase fall chinook populations

Conclusions often are not clear because fish from different stocks are not separable, observations often are confused because coho salmon are in the river at the same time, conditions for making observations are often poor, and measurement error is too great (e.g., see Table 40 – smolts estimated from spawner escapement and smolts estimated at TMFD). Sampling programs for all species need to be examined to assess whether or not the associated error makes it impossible to

gain the required conclusions in a useful timeframe, or whether appropriate modifications of the study design might be made.

### **Comments (intended to be helpful to the sponsors in revising the draft)**

- Page 135. Fall Chinook. Hatchery Effectiveness. As with spring chinook, there are so many uncertainties that it is impossible to follow the methods that are associated with each of them.
- Page 153. Table 36. The footnotes have gone amiss.
- The table numbers and figure numbers are confusing. Being shuffled together with figures makes particular tables difficult to locate because of the independent sequences of tables and figures.
- Page 169 includes a description of McKay Reservoir releases and the effects on Umatilla River flow and temperature, which could be instructive if brought in here. Won't this situation affect hatchery fish released from acclimation sites, as well as naturally produced fish? Why release from acclimation sites at all? Release hatchery fish in the area of the fishery, if the goal is to supplement the fishery.
- Page 170. Paragraph 2."The program compensated for the low spawner escapement by outplanting surplus hatchery returns from Priest Rapids and Ringold Springs hatcheries." Reviewers did not see a table with numbers of fish and dates for this particular measure.
- Project personnel have recommended "... an evaluation to test the relationships of high flow and redd scour..." and "evaluation to test the amount of sediment deposition in lower-river in fall chinook spawning habitat and its effect on egg survival." More appropriately perhaps, personnel should look for opportunities to reduce sediment input to the system, and work to regain a salmon friendly hydrograph, if feasible. However, given the summary of progress of the fall chinook program provided on page 179 of the report, quoted above, the expected benefits to fall chinook of such manipulations would seem to be slight. If development of a fishery remains a program goal, project personnel's recommendation (page 177) that "The Umatilla program needs to assess the potential benefits of producing subyearlings from a local broodstock to reduce straying, and potentially improve SAS" should be pursued in new proposals.